REMARKS

By the present amendment in the accompanying RCE, independent claims 24 and 30 have been amended to clarify features of the present invention with the dependent claims being amended in accordance with the amendments of the independent claims, noting that claims 27 and 28 have been canceled without prejudice or disclaimer of the subject matter thereof. Applicants submit that the claims patentably distinguish over the cited art, as will become clear from the following discussion.

Request for Interview

Applicants request that the Examiner, upon taking up this application for action, contact the undersigned attorney to schedule an interview prior to taking action therein.

The rejection of claims 24 - 35 under 35 USC 103(a) as being unpatentable over Moslehi (US 5,846,883) in view of Grimbergen et al (US 6,390,019) is traversed insofar as it is applicable to the present claims and reconsideration and withdrawal of the rejection are respectfully requested.

As to the requirements to support a rejection under 35 USC 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under '103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be

established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be remedied with conclusions about what is "basic knowledge" or "common knowledge". The court pointed out:

> The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

At the outset, applicants note that independent claims 24 and 30 have been amended to clarify the features of the present invention including the feature of a plate constituting a ceiling of the process chamber inside of the vacuum vessel facing the plasma, which plate covers an area extending from a center of the sample to at least a periphery of the sample, and wherein an optical transmitter is disposed inside of the vacuum vessel at a back side of the plate and almost in contact

therewith, with an end face of the optical transmitter opposed to a back surface of the plate, and an opening of a through-hole disposed in the plate having a smaller diameter than a diameter of the optical transmitter, wherein the optical transmitter receives at the end face thereof, light from the process chamber via the through hole. The independent and dependent claims also recite further features of the present invention, which are not disclosed or taught in the cited art, as will become from the following discussion.

Applicants note that as illustrated in Figures 1 and 2 of the drawings of this application and described in the specification, a plate 115 is installed on the surface of the disk form conductor 111 on the side in contact with the plasma, and the plate has trough holes therein, with figure 2 illustrating a through hole 115B, and the optical transmitter 141 being disposed at a back side of such through hole 115B. As described in the specification, at the paragraph at the bottom of page 12 of the specification, information on distribution inside the surface of the sample W can be obtained by placing the measuring port 140B at the position where the peripheral portion of the sample is measured, and by mounting the measuring port 140A at the position intermediate between the peripheral portion and the center of the sample W. Since the measuring ports are provided in the plate 115, it is readily apparent that the plate 115 covers an area which extends from the center of the sample to at least the peripheral portion of the sample, as now recited in the claims of this application, and as illustrated in Fig. 1, the plate 115 forms a ceiling part of the processing chamber. Moreover, since the claims recite the feature that an opening of a through hole in the plate has a smaller diameter than a diameter of the optical transmitter, with the optical transmitter being disposed at a back side of the plate, opposite to and almost in contact with a back surface of the plate, it is readily apparent that the

optical transmitter and end face thereof is not disposed within the through hole or the opening thereof.

Applicants note that in a prior structure, which is arranged so that an optical transmitter is buried in a through hole at the center of a plate, such as disclosed in the cited patent to Moslehi, a difference of plasma density under the through hole at the center part of a plate with other portions of the plate becomes large. A processing speed of a sample at a central part thereof greatly differs from the processing of the speed of other portions of the sample, and the problem that processing on the sample is uneven arises. Moreover, even assuming that a clearance exists by tolerance, etc., between a through hole and optical transmitter in which optical transmitters are arranged to the inside of the through hole, if the clearance faces the plasma, abnormal discharge will arise in the clearance. Especially, where electric power for the plasma generation is supplied to a plate which faces the plasma and in which a through hole is provided, abnormal discharge is often caused. This abnormal discharge leads to non-uniform plasma processing as well as damage to the plate and the optical transmitter. Accordingly, the present invention provides a structure as recited in the independent claims wherein a bad influence of abnormal discharge is restrained due to the structural arrangement of the optical transmitter at the back side of the opening of the through hole of the plate.

Considering abnormal discharge, reference is made to Appendix A, attached hereto. In Appendix A, condition (A) shows a plate of almost new state condition (B) shows a plate after 50 hours of use in an abnormal discharge occurring condition, and condition (C) shows a plate after 100 hours of use without abnormal discharge occurring, which corresponds to the structural arrangement as obtained with the present invention. If the space between the plate and the optical transmitter is

enlarged as obtained with condition (B), abnormal discharge arises and the plate surface opposed to the optical transmitter will be cut by reaction. Eventually, the diameter of the through hole penetration hole will become enlarged. If the apparatus continues to be used without taking measures with respect to this abnormal discharge, it will produce change in processing time for the reason of the enlarged diameter of the through hole and will adversely affect the reproducibility of the processing of the sample.

In order to restrain this problem, in accordance with the present invention, an optical transmitter is arranged so that the end face thereof is almost in contact with the back side of the plate at an opening of the through hole of a smaller diameter than the diameter of the optical transmitter, so that the light from the processing chamber which passes through the through-hole is received by the optical transmitter, as now recited in independent claims 24 and 30. If, however, it is considered to reduce abnormal discharge by eliminating a gap of the optical transmitter and the back side of the plate by bonding the optical transmitter to the back side of the plate, a problem occurs that when the plate is heated by electric power for generating plasma, which plate faces the plasma, the temperature of the plate increases and the form of a plate changes with such temperature rise. Where the optical transmitter is connected to or bonded to such plate, in view of displacement of portions of the plate, due to temperature increase therein, displacement occurs which becomes large when a plate extends from a center to at least the periphery of the sample, as in the present invention. Accordingly, the present invention provides a separate holding member which holds the optical transmitter at an upper side portion of the plate at the back side of the plate so that the holder and the optical transmitter are not directly connected to the back side of

the plate, whereby abnormal discharge of the back side of the plate is restrained and displacement of the transmitter with respect to displacement of the plate is restrained for long periods of use as is obtained by condition (C) of Appendix A. Thus, as shown by condition (C), the structural arrangement enables proper operation for extended periods of time, which is not provided by the cited art, as will become clear from the following discussion.

Turning to Moslehi, this patent discloses HMZ ICP source 100 that includes water-cooled or temperature-controlled metallic top vacuum plate 102 providing a coil like arrangement, which may be formed of stainless steel or aluminum, that adjoins top dielectric plate 104 which is hermetically sealed or bonded to middle dielectric plate 106, which itself hermetically bonds to shower head injector plate 108 wherein an optical plug or window 110 passes through the metallic top plate 102, top dielectric plate 104, middle dielectric plate 106, and shower head injector plate 108, and provides an optical view port to the entire wafer surface through the fabrication process. It is noted that the injector plate 108 includes many holes for supplying gas for processing therethrough. Moslehi discloses a structure which enables the view port to observe the hole wafer surface through an end surface of the plug that faces the process chamber from the large diameter hole inside shower head plate provides no disclosure concerning the problem of reaction products in the processing chamber adhering to the surface of the tip part of the optical plug nor any suggestion for restraining such action. As is apparent, irrespective of the contentions by the Examiner, Moslehi does not disclose an optical transmitter being disposed inside of the vacuum vessel at a back side of the plate with an end face of the optical transmitter opposite to and almost in contact with the back surface of the plate, an opening of the through-hole in the plate having the smaller diameter than a diameter

of the optical transmitter, and the optical transmitter receiving at the end face thereof, light from the process chamber via the through-hole. Thus, irrespective of the contentions by the Examiner, applicants submit that Moslehi fails to provide the structural arrangement as recited in independent claims 24 and 30 and the dependent claims of this application.

The Examiner recognizing the deficiencies of Moslehi et al, cites Grimbergen et al as disclosing a process chamber and optical transmitter with through holes to allow light for the sensor to pass through holes, which allow the light to reach the sensor and reduce the possibility of deposition on the optical transmitter. Irrespective of the Examiner's position, applicants submit that Grimbergen et al discloses a process monitoring system which has a window arranged at an upper part of the processing chamber and through which light from the wafer passes. Although the Examiner contends that it would be obvious to combine Grimbergen et al and Moslehi, in Moslehi, an optical plug is utilized, and it would be contrary to the disclosure in Moslehi to utilize the teaching of Grimbergen et al therein. See In re Fine, supra. Moreover, in Moslehi, the optical plug and shower head have a large diameter hole for observing the whole surface of a wafer, and if the aperture structure as indicated by Grimbergen et al is arranged on the plasma side of the plug of Moslehi, the domain of the wafer which can be observed by an optical plug is limited. In Grimbergen et al, the range of an aperture is a range limited to the area on the surface of a wafer as described in column 10, lines 48 - 59 of such patent. Moreover, it is readily apparent that Grimbergen et al does not disclose a through hole in a plate to which electric power is supplied for generating plasma. Moreover, Grimbergen et al in Fig. 3a, discloses that a window 130 apparently comprises a transparent plate 135 and an overlying mask 140 having at least one aperture 145

extending therethrough, with the mask 140 covering the surface of the transparent plate 135. However, when a plate and optical plug of Moslehi is replaced, when electric power is applied to the ceiling and the mask of the processing chamber, there is a possibility that abnormal discharge will occur in the space between the mask and optical plug. Since the mask differs from the shower head of Moslehi, and Grimbergen et al describes 135 as a transparent plate and not an optical transmitter, which receives light via the through hole and is not arranged in the manner set forth in the claims of this application, it is readily apparent that the combination does not provide the claimed features of the independent and dependent claims of this application, nor can Grimbergen et al be properly combined with Moslehi, as contended by the Examiner. As such, applicants submit that all claims present in this application patentably distinguish over this proposed combination of references in the sense of 35 USC 103 and all claims should be considered allowable thereover.

With respect to the dependent claims, applicants note that the dependent claims recite specific features concerning the plate being made of an electrically conductive material and the ratio of diameter and depth of the through-hole as well as other features of the present invention which are not disclosed or taught in the cited art. Thus, the dependent claims further patentably distinguish over the cited art and should be considered allowable thereover.

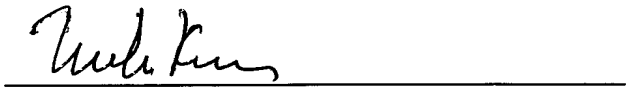
In view of the above amendments and remarks, applicants submit that all claims present in this application patentably distinguish over the cited art and should now be in condition for allowance. Accordingly, issuance of an action of favorable nature is courteously solicited.

Again, applicants request the Examiner to contact the undersigned attorney to schedule an interview when taking this application up for action.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 520.39649CX3), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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